CHROMOSOME NUMBERS IN PHYSALIS AND SOLANUM (SOLANACEAE)[1]

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While conducting a chromosomal survey of *Chamaesaracha*, meiotic materials of several other Solanaceous taxa were collected from a wide area of the southwestern United States and northern Mexico. Chromosome counts obtained from this material are reported in Table I.

Techniques for producing pollen mother cell squashes essentially follow those presented by Turner and Johnston (1961). Voucher specimens are deposited in the herbaria of The University of Texas, Austin, and Sul Ross State University. We are grateful to Dr. U. T. Waterfall for the identification of many of the Mexican species of *Physalis*.

Table I. Species of *Physalis* and *Solanum* examined for chromosome number.

Taxon	*Chromosome number (n)*	*Vouchers*
PHYSALIS:		
P. crassifolia Benth. var. *crassifolia*	12	MEXICO: B.C.S. 67 mi N of Villa Constitution. *Sikes and Babcock 280a,b,c.*
	12	MEXICO: B.C.S. 2 mi N of San Antonio. *Sikes and Babcock 266.*
	12	MEXICO: B.C.N. 27 mi NE of San Felipe-Rosario Junction. *Sikes and Babcock 307.*
P. crassifolia Benth. var. *infundibularis* I.M. Johnst.	12	MEXICO: B.C.N. 7 mi NE of San Felipe-Rosario Junction. *Sikes and Babcock 305.*
**P. glabra* Benth.	12	MEXICO: B.C.S. 7 mi W of La Palmilla. *Sikes and Babcock 242.*
**P. glutinosa* Schlect. var. *glutinosa*	12	MEXICO: Durango. 4 mi W of Durango. *Sikes and Babcock 375.*
P. hederaefolia Gray var. *cordifolia* (Gray) Waterfall	12	NEW MEXICO: Otero Co. 29 mi SE of Cloudcroft. *Sikes 69.*
	12	ARIZONA: Yavapai Co. 38 mi S of Flagstaff. *Tomb 272.*
**P. hederaefolia* Gray var. *hederaefolia*	12	TEXAS: Brewster Co. 6 mi S of Alpine. *Averett 126.*

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	12	TEXAS: Brewster Co. 13 mi S of Alpine. *Averett 111.*
	12	TEXAS: Brewster Co. 6 mi S of Alpine. *Boston 29.*
	12	MEXICO: Durango. 15 mi N of La Zarca Junction on Mex 45. *Sikes and Babcock 364.*
P. lobata Torrey	12	TEXAS: Brewster Co. 16 mi E of Alpine. *Averett 84.*
	11	TEXAS: Ector Co. 10 mi N of Odessa. *Watson 139.*
	11	TEXAS: Ector Co. 14 mi S of Odessa. *Watson 191.*
	11	TEXAS: Pecos Co. 18-24 mi W of Bakersfield. *Tomb 414.*
	11	TEXAS: Pecos Co. 21 mi E of Ft. Stockton. *Tomb and Bierner 430.*
	11	TEXAS: Presidio Co. 11 mi N of Presidio. *Sikes and Averett 139.*
	11	TEXAS: Val Verde Co. 1 mi E of Langtry. *Averett 283.*
	11	TEXAS: Val Verde Co. E city limits of Del Rio. *Tomb 402.*
	11	TEXAS: Terrell Co. 3/4 mi W of Dryden. *Averett 277.*
	11	NEW MEXICO: Chaves Co. 13 mi W of Roswell. *Averett and Tomb 330.*
	11	NEW MEXICO: Grant Co. 9 mi W of Hachita on N. Mex #9. *Tomb and Bierner 441.*
	11	MEXICO: Chihuahua. 26 mi NE of Carmargo. *Sikes and Patterson 406.*
	22	NEW MEXICO: Lea Co. 1 mi W of Broncho. *Averett and Tomb 321.*
	22	NEW MEXICO: Union Co. 18 mi W of Clayton. *Tomb 538.*
	22	OKLAHOMA: Cimarron Co. 12 mi S of Campo, Colorado. *Tomb 342.*
	22	TEXAS: Concho Co. 3 mi S of Runnels county line on hwy. 83. *Averett and Bierner 484.*
	22	TEXAS: Hardeman Co. 3 mi S of Quanah. *Averett and Bierner 477.*
	22	TEXAS: Jones Co. 3 mi S of Stamford. *Averett and Bierner 479.*
	22	TEXAS: Lubbock Co. 11 mi N of Lubbock. *Averett and Tomb 355a.*
	22	TEXAS: Young Co. Olney, Texas. *Seigler 1469.*
	22	MEXICO: Coahuila. 43 mi NW of Muzquiz. *Powell and Patterson 1586.*
**P. sordida* Fernald	12	MEXICO: Sinaloa. 3 mi N of Mazatlan. *Sikes and Babcock 200.*

*_P. vestita_ Waterfall	12	MEXICO: Sinaloa. 6 mi N of Mazatlan. _Sikes and Babcock 202._
P. viscosa L. var. _cinerascens_ (Dunal) Waterfall	12	TEXAS: Bee Co. N side of Beeville. _Tomb 354._
	12	TEXAS: Ector Co. 14 mi S of Odessa. _Watson 190._
	12	TEXAS: Jeff Davis Co. 26 mi W of Toyahville. _Sikes 349._
P. wrightii Gray	12	ARIZONA: Pinal Co. 39 mi S of Phoenix. _Averett and Watson 411._
	12	ARIZONA: Pinal Co. 30 mi S of Phoenix. _Averett and Watson 412._
SOLANUM:		
*_S. amazonicum_ Ker.	12	MEXICO: Sonora. 1 mi E of Navajoa. _Sikes and Babcock 184._
S. eleagnifolium Cav.	12	TEXAS: Brewster Co. 6 mi SW of Marathon. _Watson 18._
	12	TEXAS: Hudspeth Co. 1 mi W of Sierra Blanca. _Sikes 60a._
	12	TEXAS: Hudspeth Co. 1 mi W of Sierra Blanca. _Sikes 60b._
	12	TEXAS: Jeff Davis Co. 24 mi NW of Ft. Davis. _Boston 11._
	12	NEW MEXICO: Hidalgo Co. 17 mi W of Lordsburg. _Averett and Watson 383._
*_S. hindsianum_ Benth.	12	MEXICO: B.C.S. 1 mi N of Villa Constitution. _Sikes and Babcock 253._
*_S. madrense_ Fernald	12	MEXICO: Sinaloa. 70 mi S of Mazatlan. _Sikes and Babcock 208._
S. nigrum L.	12	ARIZONA: Cochise Co. 24 mi W of E entrance to Chiricahua Nat'l. Monument. _Averett and Watson 392._
	12	ARIZONA: Greenlee Co. 12 mi W of Mule Creek, N. Mex. _Averett and Watson 435._
	12	ARIZONA: Santa Cruz Co. Madera Canyon. _Averett and Watson 408._
	12	NEW MEXICO: Chaves Co. 43 mi SE of Cloudcroft. _Sikes 71._
	12	NEW MEXICO: Hidalgo Co. 10 mi S of I-10 on U.S. 80. _Averett and Watson 384._
	12	TEXAS: Jeff Davis Co. 1 mi E of Boy Scout Camp. _Sikes 345._
	12	TEXAS: Presidio Co. Pinto Canyon. _Sikes 82._
	12	TEXAS: San Patricio Co. Lake Corpus Christi State Park. _Tomb 359._
S. rostratum Dunal	12	TEXAS: Brewster Co. 21 mi E of Alpine. _Watson 63._

**S. triflorum* Nutt.	12	UTAH: Beaver Co. 12 mi E of Milford. *Averett and Watson 421.*

* First report for the taxon.

DISCUSSION

Excepting $n = 11$ in *P. lobata* (= *Quincula lobata* (Torr.) Raf.), chromosome numbers presented for the 18 taxa of *Physalis* and *Solanum* are on a base of $x = 12$. Initial counts are reported for nine taxa which are denoted by an asterisk in Table I. Most of the species examined are diploid ($n = 12,11$), substantiating the rarity of polyploidy in *Physalis, Solanum,* and related genera. In the Solanae, *Chamaesaracha* alone displays considerable polyploidy (Powell and Averett, 1967).

Some elaboration is appropriate with regard to the occurrence of diploid and tetraploid races in *P. lobata* (Table I.). Menzel (1950) observed that three seed classes (based on size) of this species are correlated with fairly distinct geographic ranges. As seen in Figure 1, class I (2.7-3.0 mm) extends from central Texas north into Kansas, Colorado, and New Mexico. Class II (1.8-2.2 mm) is largely restricted to southern and western regions of Texas and adjacent Mexico. Class III (3.8-4.0 mm) is limited to southern Arizona. Based upon counts from one tetraploid and four diploid populations, Menzel further correlated seed sizes with chromosome numbers in classes I and II, representing the $4n$ and $2n$ populations respectively. A still higher ploidy level was thought to characterize class III. The counts reported in Table I generally adhere to the geographic ranges for the diploid and tetraploid races suggested by Menzel (Figure 1). No chromosome counts are available from southern Arizona (class III).

Menzel (1950) also noted a few herbarium specimens with large seeds within the range of the small-seeded populations and *vice versa*. Chromosome counts for these mixed populations are lacking, but a tetraploid count for *P. lobata* was obtained from specimens collected in northern Mexico, well within the diploid range of the species (Figure 1).

An autoploid origin is suspected for the tetraploid race of *P. lobata*. Morphologically the tetraploids are nearly identical to the diploids, and there is no indication that other species have been involved in their origin. Although segmental allopolyploidy is possible, Lewis (1967) has pointed out that it is not necessary to postulate a hybrid origin between ecologically distinct populations in order to account for the establishment and maintenance of discrete polyploid populations. In any case, even considering alloploidy, the tetraploid race presumably arose in desert areas of the southwestern United States and northern Mexico, and subsequently spread into the grassland areas to the north.

Menzel (1950) concluded that the $n = 11$ in *P. lobata* was derived from $n = 12$ by aneuploid loss. The existence of $n = 12$ in this taxon could be offered to support this conjecture. However, the extra chromosome could have resulted through aneuploid gain.

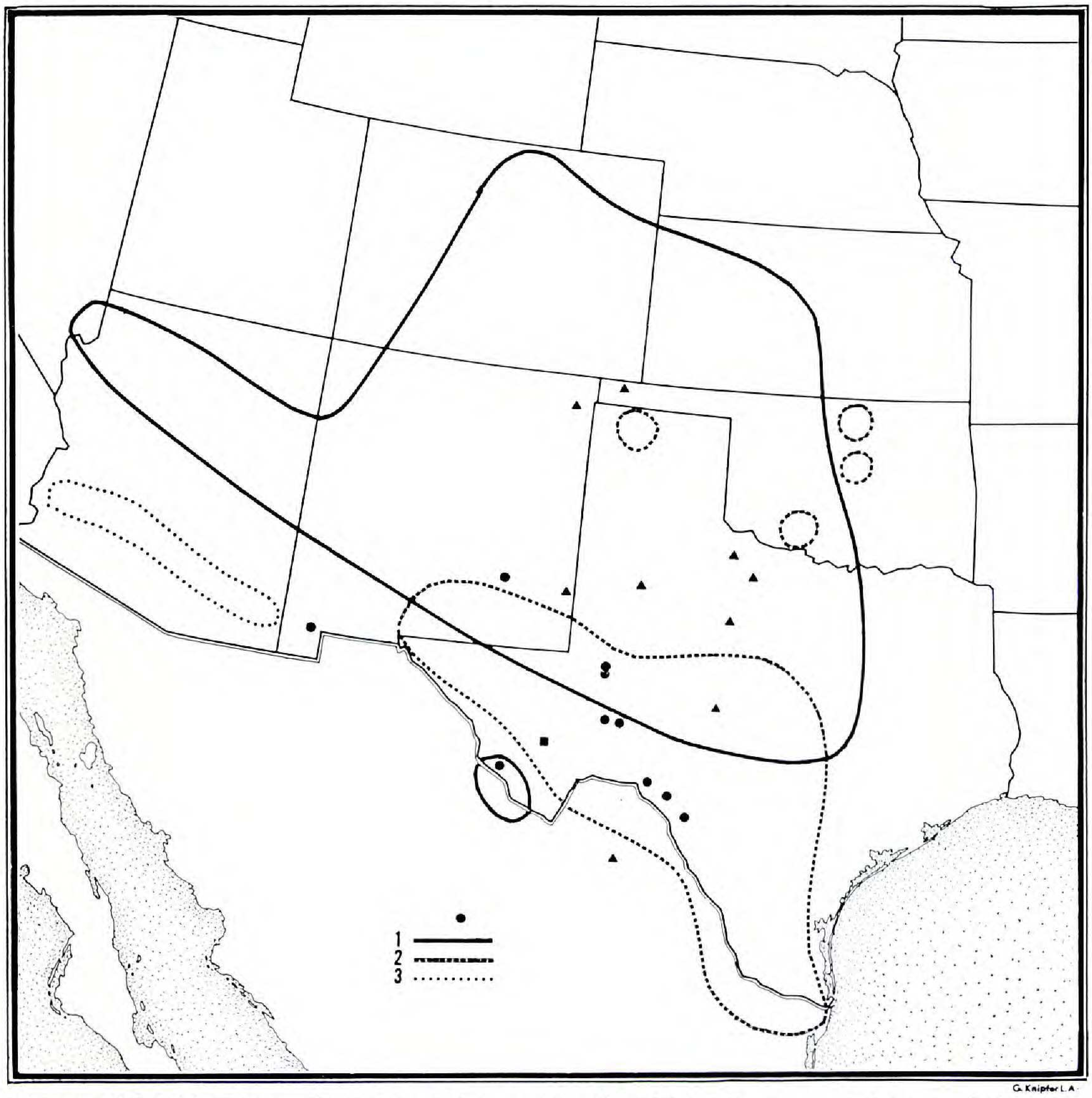

Fig. 1. Distribution of tetraploid and diploid *Physalis lobata*; triangles ($n = 22$), circles ($n = 11$), and squares ($n = 12$). The distribution of three classes of seed sizes recognized by Menzel (1950) is also shown; 1 (2.7-3.0 mm), 2 (1.8-2.2 mm), and 3 (3.8-4.0). Discussion in text.

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